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ABSTRACT

This paper presents a global approach to the media comparison literature. Beginning with the pros and cons of media research, it discusses the results of both individual and meta-analysis research, compares the different methods researchers have used to determine media selection, and concludes with the most recent trends in media selection. It is suggested that two questions still need to be answered: (1) Which is the best medium to use?; and (2) What direction is media research taking? Current trends in media research suggest that the profession has completed the circle and is back to where it has been all along: analyze the task, analyze the learner, and match these with the objectives and materials to be learned. It is concluded that, although the new emphasis is on the learner, the effective teacher or instructional designer must, above all, know the critical attributes of each medium and match these with the learner and the learning task. (57 references) (EW)

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Media Comparison : Viewing the Past While Looking Toward the Future

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Running head: MEDIA COMPARISON

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Research on media selection began as far back as 1894 when Munsterberg & Bigham concluded that media presentations utilizing two senses were better than presentations that utilized only one sense (hearing). Since then, the criteria for selecting a particular medium have varied. With the advent of each new medium there has been a sudden rush of research hoping to determine the superiority of the newest medium over conventional instruction (Levie,1986). The results of media comparison research have ranged from a significant difference to no significant difference; from encouragement to discouragement. This paper will present a global approach to media comparison literature. It will begin with the pros and cons of media research, discuss the results of both individual research and meta-analysis research, compare the different methods researchers have used to determine media selection, and conclude with the most recent trends in media selection.

I. The Purpose of the Medium

Communication is a process by which a person (sender) encodes a message and another person (receiver) decodes this message in an attempt to accurately interpret its implied meaning. This process is highly dependent upon some commonality between the sender and receiver. The problem for instructional designers and educators is to transmit messages via a medium that both enhances and clarifies the intended message. Salomon (1970) suggests that media be defined in terms of its unique presentation mode while, Hayman and Dawson (1968) say that media should be defined in terms of meaningful "gestalts" which result from various elements combining to form a particular mode of communication.

There are three major objectives of media research: 1) "...obtain knowledge about the instructional effectiveness of a chosen medium or technology...; 2)...increase understanding of how media and technology function and what psychological effects they have on learners; and 3)...enhance the practice of education through providing and evaluating improved media, materials, procedures, and technologies" (Salomon & Clark, 1977, pp. 99-100). The first objective is accomplished through comparisons between two media. The second objective is related to the first, but deals more with the psychological implications of the medium rather than the effectiveness. The third objective is accomplished through evaluation studies of media and the programs that have been developed for them (Salomon & Clark, 1977).

Exactly which medium is best for the task is debatable. As professionals develop more technical delivery systems, the image of the "ideal" medium becomes lost. With each new technological innovation, there is a progression of research questions which follow (Wartella & Reeves, 1983). Media selection is further complicated by the new technology advocates. These advocates quickly rush to make broad claims about the positive effect for each new piece of technology on achievement levels (Campbell, 1987).

The problem is further complicated by the mass media. For example, in computer research there is evidence to suggest that a bias exists to publish papers in which performance gains attributable to the use of computers are reported (Clark, 1985). The result is a debate as to whether or not the profession should consider media comparison studies at all. Levie and Dickie (1973) stated that most media comparisons are fruitless and a variety of media could be used to accomplish an objective. Lumsdaine (1963) maintains that gross media comparisons are not useful at all. Others (Knowlton, 1964; Milke, 1968, 1971) claim that the question, "Is one medium better than another?",

is not valid due to the excess of confounding variables associated with this type of research, nor does researching this question provide insight into how people learn from media presentations. Salomon (1978) goes even further to state that gross media comparisons cannot lead us to understanding media's potential in education.

Perhaps the most vociferous critic of media comparison is Richard Clark. As far back as 1975, he has debated the issue of research with as opposed to research on media. This argument culminated in his now famous article, "Reconsidering Research on Learning", published in 1983. This article maintained that it is the variables, such as instructional methods, that promote learning. The medium is merely the vehicle. According to Clark,

> "Where learning benefits are at issue...it is the method, aptitude, and task variables of instruction that should be investigated. Studies comparing the relative achievement advantages of one medium over another will inevitably confound medium with method of instruction" (Clark, 1983, pp. 450-51).

Clark goes on to state that it is the attributes of the medium which should be more closely examined rather than the medium itself.

There are critical features of the cognitive process which also must be examined to develop successful instructional methods (Clark, 1982). These features must be translated to a symbol system and delivered through a conventional medium. When the symbol system is correctly delivered, learning will occur (Clark, 1983). It is the differences in the qualities attributed to each medium that may influence learning.

Media attribute research seems to offer a compromise for those interested in media research. Indeed, there are those who feel media research must continue

(Clark & Salomon, 1986; Kellerman, 1984; Petkovich & Tennyson, 1984; Salomon, 1978). No real gains are seen if research is abandoned. And, as new media appear, how will they be properly evaluated? The problem is not technology, it is the failure to discover the relationship of variables of media techniques to the learning process (Hajory &Tennyson, 1987). These arguments imply that media research should continue, but it is the focus, however, that must change.

II. Research on Media

Research on media has an equally interesting and conflicting history which can be divided into the types of media including: 1) pictures, 2) audio tape, 3) film, 4) television, 5) programmed instruction machines, and 6) computers, which includes both computer-based instruction (CBI) and computer-assisted instruction (CAI). Tosti and Ball (1969) claimed that almost anything can be taught to literate learners using only printed text and illustrations. Salomon's concept of supplanting (1970, 1980) further stressed the importance of pictures. Much research has been conducted that favors pictures to enhance the learning process (Fleming & Levie, 1984; Knowlton, 1966; Levie, 1973; Pavio, Rogers, & Smythe, 1968; Tennyson, 1978). Pavio (1968; 1971) proposed a dual coding memory system to explain the advantage of using pictures. According to this theory, people have a verbal system to store linguistic information and a non-verbal system to store mental images. Things are remembered better because two memory traces are better than one. On the strength of this research, the term "pictorial superiority effect" was created (Levie, 1986).

Yet, there is some question about the total acceptance of using pictures in instruction. Samuels (1970) claims pictures interfere with learning how to read by providing

distracting stimuli, which was especially true for poorer students. Dwyer (1970) suggested that vividness will distract the learner from his task.

Studies in auditory presentations have had mixed results based on the learning task and the participants used in the research. When comparing auditory and visual presentation of text to literate audiences, reading was found to be superior to listening (Gulo & Baron, 1965; Thalberg, 1964; Haugh, 1952; James, 1962; Haywood, 1951; Cody, 1962; Schulz & Kaschow, 1966). The reason suggested for this advantage was that listening students had only one exposure while those reading could reread the information presented. Yet others maintained that auditory presentation was superior to visual presentation on short term learning tasks (Craik, 1969; Margrain, 1967).

Media comparisons with film have also had varying results. The overall trend seems to show no true significant differences (Chu & Schramm, 1967; Reid & MacLennon, 1967). The same general results were found in media comparisons involving television (Allen, 1971; Campeau, 1966; McKeachie, 1967; Traveggia, 1969). According to Garner (1982), the major problem with research on television is the availability of control groups, as virtually every home in America has television.

Campeau (1974) reviewed 97 reports and 92 journal articles that compared programmed instruction with conventional instruction and found that no clear pattern emerged. Although Hartley (1968) found differences in favor of programmed instruction, there were others (Briggs, 1968; Marsh & Pierce-Jones, 1968) who found no significant differences when using programmed instruction.

The latest technological tool to come under scrutiny is the computer. Once again evidence runs in both directions. There are those whose research favors using computers (Holmes, 1982; Rapport & Savard, 1980; Kulik, 1983), those who do not (Hartley, 1977), and those who say that the research is confounded by too many extraneous

variables (Clark, 1983). There are a large number of media studies that have been conducted, and, if each is evaluated separately, the total picture would be difficult to see (Kulik, 1983).

A meta-analysis approach appears to be a way to see the broader scope. Vinsonhaler and Bass (1972) analyzed 10 studies while Kulik (1983) analyzed 51 studies and determined that CBI is effective as a teaching tool, even though the results were only moderate. However, this approach also appears to be tainted. There are severe methodological problems found in the meta-analysis approach that prevents correct interpretation of data. The treatments appear to be poorly defined, and are confounded with differences in content and instructional strategy (Salomon & Clark, 1986). Also, meta-analysis is limited in that it provides a picture of the past rather than a clear view of the future.

III. Media Selection

There have been a number of ideas developed trying to determine how to select the correct media (Briggs, 1967; Clark, 1972; DiVesta, 1975; Salomon, 1979; Meridith, 1965; Fleming, 1967; Bretz, 1971; Gropper & Glasgow, 1971; Tosti & Ball, 1969). One such theory was called "correct formula", and provided a check list to compare media; the correct medium to use in a given situation was the one with the highest number of points checked off from the list.

Similar to the theory of a correct formula for media selection is the idea of a taxonomy of media based on any number of factors. The two most important ideas are the ATI (aptitude-treatment interaction) and the attribute theory. Both were originated in the early 1970's, with ATI actually furthering the cause of the attribute theory. As educa-

tional psychologists became more committed to the development of new measures of ability, attitude, and aptitude, ATI developed as a fruitful approach for research on instructional media (Glaser, 1972; Clark, 1972; DiVesta, 1975). This expansion of knowledge was limited because there was not an equal effort to increase the knowledge about treatments. As early as 1969, methods of characterizing treatments were considered primitive (Mitchell, 1969), and others warned that ATI approach would never "go far" (Shulman, 1970).

The solution to the problem lies in the distinction between research with and on media. Although these ideas were casually mentioned as early as 1969 by Tosti & Ball, it took a few more years before the real distinctions became clear. Research with media provides little knowledge about the specific medium used, nor does it provide insights about how students learn (Milke, 1968; Clark, 1975). Research on media deals with the relevant attributes of media that interact with individual differences to promote learning. Salomon (1970) suggests that media should be defined in terms of these unique attributes which enhance the learning process. It is often the subtle differences in the media that may influence learning related behaviors, and learning is the result of attributes activating specific strategies needed for the task.

To this end, Clark (1982, 1983) has identified three dimensions of peoples' beliefs and attributions about media—preference, difficulty, and learning. He found that preference and learning are negatively related, that is, students tend to like least the activity or source from which they learn the most. Krendel (1986), building on Clark's research, found that preconceptions about a particular medium vary across these same three dimensions. Citing Salomon and Leigh's (1984) research on preference, Krendl also noted that:

> "...students preferred the medium they found easiest to use, and the easier it was to use, the more they felt they learned from it. However, measures of inference making suggested that these perceptions of enhanced learning from the 'easy' medium were misleading" (p. 226).

IV. Conclusion

There are 2 questions that have yet to be answered: 1) Which is the best medium to use?; and 2) What direction is media research taking? To answer one fully is to answer the other. The best medium for the job is the one that works! It is one that has the necessary critical attributes that the instructional designer uses to cue the learner. It is important that a task and audience analysis be performed to determine what is critical to the learning task. For example, handicapped students wanted a teacher with infinite patience and one who could provide teacher feedback. For this task, a computer was chosen to deliver the learning. A media's characteristics are flexible for any given situation. It is the attributes of each medium that are now being examined. The burden rests squarely on the instructional designer. Media are not a panacea that can be snatched off the shelf when the teacher or designer of instruction is not adequately prepared. Poorly planned instruction will fail to accomplish its stated objective whether presented on a computer, filmstrip, or television.

Current trends in media research suggests that the profession has completed the circle and is back to where they have been all along: analyze the task, analyze the learner, and match these with the objectives and material to be learned. The new emphasis is now on the learner. Wohl & Tidhar (1988) state that the learner's preconceived notions about a particular medium will dictate whether the receiver will actively or

passively process the information.

The only thing that is new is another medium to transmit information. What is important is the extent to which this vehicle can perform a particular task in a given situation. The medium is not important, it only serves to enhance and encourage. Knowing the critical attributes of each medium and matching these with the learner and the learning task is what makes an effective teacher or instructional designer.

REFERENCES

Allen, W. H. (1971). Instructional media research. AV Communications Review, 19, 5-18.

Baumgart, D., & VanWalleghem, J. (1987). Teaching sight words: a comparison between computer-assisted and teacher-taught methods. Education and Training in Mental Retardation, 22 (1), 56-65.

Briggs, L.J., Campeau, P., Gagne, R., & May, M. (1967). Instructional Media: A Procedure for the Design of Multimedia Instruction, A Critical Review of Research and Suggestions for Future Research. Pittsburgh: American Institute for Research.

Campbell, D. L., Peck, D. L., Horn, C. J., & Leigh, R. (1987) Comparison of computer-assisted instruction and print drill performance: a research note. Educational Communication and Technology Journal, 35 (2), 95-103.

Campeau, P. L. (1966). Selective review of literature on audiovisual media of instruction. In J. L. Briggs et al., Instructional Media: A Procedure for the Design of Multi-Media Instruction (abbreviated title). (pp. 99-142). (Monograph No. 2). Pittsburgh: American Institutes for Research.

Campeau, P. L. (1974). Selective review of the results of research on the use of audio-visual media to teach adults. AV Communications Review, 22(1), 5-40.

Chu, G. C., & Schramm, J. C. (1967). Learning from television: What the research says. (ED 014 900). Stanford: Stanford University, Institute for Communication Research.

Clark, R. E. (1972). Planning instructional media: An alternative approach. The Urban Review, 6 (2), 30-33.

Clark, R. E. (1975). Constructing a taxonomy of media attributes for research purposes. AV Communications Review, 23 (2), 197-215.

Clark, R. E. (1982). Antagonism between achievement and enjoyment in ati studies. The Educational Psychologist, 17(2), 92-101.

Clark, R. E. (1983). Reconsidering research on learning from media. Review of Educational Research, 53 (2), 445-459.

Clark, R. E., & Salomon, G. (1975). Reexamining the methodology of research on media and technology in education. Review of Educational Research, 47 (1), 99-120.

Cody, M. I. (1962). An investigation of the relative effectiveness of four modes of presenting meaningful material to twelfth-grade students. (Doctoral dissertation, Fordham University). Ann Arbor: University Microfilms.

Craik, F. I. M. (1969). Modality effects in short-term storage. Journal of Verbal Learning and Verbal Behavior, 8, 658-664.

DiVesta, F. J. (1975). Trait-treatment interactions, cognitive processes, and research on communication media. AV Communications Review, 23, 183-196.

Dwyer, F. M. (1970). Exploratory studies in the effectiveness of visual illustrations. AV Communications Review, 18, 235-249.

Fleming, M. (1967). Classification and analysis of instructional illustrations. AV Communications Review, 15, 246-258.

Fleming, M., & Levie, W. H. (1984). Instructional Message Design. Englewood Cliffs, N. J.: Educational Technology Publications.

Glaser, R. (1972). Individuals and learning: The new aptitudes. Educational Researcher, 1 (6), 5-13.

Gropper, G. L., & Glasgow, Z. (1971). Criteria for the selection and Use of Visuals in Instruction: A Handbook. Englewood Cliffs, N. J.: Educational Technology Publications.

Gulo, E. V., & Baron, A. (1965). Classroom learning of meaningful prose by college students as a function of sensory mode of stimulus presentation. Perceptual and Motor Skills, 21, 183-186.

Hartley, J. R. (1968). An experiment showing student benefits against behavioral costs in using programmed instruction. Programmed Learning and Educational Technology, 5, 219-229.

Harwood, K. A. (1951). An experimental comparison of listening comprehensibility with reading comprehensibility. Speech Monograph, 18, 123 (Abstract).

Haugh, O. M. (1952). The relative effectiveness of reading and listening to radio drama as ways of imparting information and shifting attitudes. Journal of Educational Research, 56, 126-132.

Hayman, J. L., & Dawson, M. (1968). Development and modification of attitudes through educational media. In R. A. Weisgerber (Ed.) Instructional Process and Media Innovation (pp. 40-61).

James, N. E. (1962). Personal preference for method as a factor in learning. Journal of Educational Psychology, 53, 43-47.

Kellerman, J. (1984, January). Low-tech: High-fear hucksters push kid computers. Otherviews, 13A.

Knowlton, J. Q. (1964). A Socio-Linguistic Theory of Pictorial Communication. Bloomington, Ind: Indiana University, AV Center.

Knowlton, J. Q. (1966). On the definition of "picture." AV Communications Review, 14, 157-163.

Kulik, J. A. (1983). Synthesis on research on computer based instruction. Educational Leadership, 41, 19-24.

Levie, W. H., & Dickie, K. E. (1973). The analysis and application of media. In Robert M. Travers (Ed.) Second Handbook of Research on Teaching (pp. 858-882). Chicago: Rand McNally.

Lumsdaine, A. A. (1963). Instruments and media of instruction. In N. L. Gage (Ed.) Handbook of Research on Teaching (pp. 583-682). Chicago: Rand McNally.

Margrain, S. A. (1967). Short-term memory as a function of input modality. Quarterly Journal of Experimental Psychology, 19, 109-114.

Milke, K. W. (1968). Asking the right ETV questions. Educational Broadcasting Review, 2 (6), 54-61.

Milke, K. W. (1971). Evaluation of learning from televised instruction. In R. C. Burke (Ed.) Instructional Television. Bloomington, Ind.: Indiana Press.

Murdock, B. B. (1968). Modality effects in short-term memory: Storage or retrieval? Journal of Experimental Psychology, 77, 79-86.

Pavio, A. (1971). Imagery and language. In S. J. Segal (Ed.) Imagery. New York: Academic Press.

Pavio, A., Rogers, T. B., & Smythe, P. C. (1968). Why are pictures easier to recall than words? Psychonomic Science, 11, 137-138.

Petkovich, M D., & Tennyson, R. D. (1984). Clark's "learning from media": A critique. Educational Communication and Technology Journal, 32 (4), 233-241.

Reid, J. C., & MacLennan, D. W. (1967). Research on instructional television and film (ED 015 673). Washington, D. C.: U. S. Government Printing Office.

Salomon, G. (1970). What does it do to johnny? Viewpoint, 46, (5), 33-62.

Salomon, G. (1971). Summary and Comments. In M. L. Fleming (Ed.), Aspects of perception—Their relation to instructional communications. Viewpoints, 47, 207-214.

Salomon, G. (1972). Can we affect cognitive skills through visual media? An hypothesis and initial findings. AV Communications Review, 20, 401-422.

Salomon, G. (1978). On the future of media research: No more full acceleration in neutral gear. Educational Communication and Technology Journal, 26 (1), 37-46.

Salomon, G. (1980). The use of visual media in the service of enriching mental thought processes. Instructional Science, 9, 327-339.

Salomon, G. (1984). Television is "easy" and print is "tough": The differential investment of mental effort in learning as a function of perceptions and attributions. Journal of Educational Psychology, 76, 647-658.

Samuels, S. J. (1970). Effects of pictures on learning to read, comprehension and attitudes. Review of Educational Research, 40, 397-407.

Schulz, R. W., & Kasschau, R. A. (1966). Serial learning as a function of meaningfulness and mode of presentation with audio and visual stimuli of equivalent duration. Journal of Experimental Psychology, 71, 350-354.

Shulman. L. S. (1970). Reconstruction of educational research. Review of Educational Research, 40, 371-396.

Stuck, D. L., & Manatt, R. P. (1970). A comparison of audio-tutorial and lecture methods of teaching. Journal of Educational Research, 63, 414-418.

Tennyson, R. D., & Rothen, W. (1977). Pre-task and on-task adaptive design strategies for selecting number of instances in concept acquisition. Journal of Educational Psychology, 69, 586-592.

Tennyson, R. D. (1978). Pictorial support and specific instructions as design variables for children's concept and rule learning. Educational Communication and Techonology Journal, 26, 291-299.

Thalberg, S. P. (1964). An experimental investigation of the relative efficiency of the auditory and visual modes of presentation of verbal material. Unpublished doctoral dissertation, State University of Iowa.

Tosti, D. T., & Ball, J. R. (1969). A behavioral approach to instructional design and media selection. AV Communications Review, 17, 5-25.

Visonhaler, J. F., & Bass, R. (1971). Computer management of instructional resources. Educational Technology, 32, 32-35.

Wager, W. (1986). Comparative analysis of television tutorial and cai for the teaching of typing skills to radio-teletypewriter operators. Educational Communication and Technology Journal, 34 (2), 97-104.

Wartella, A. & Reeves, B., (1983). Recurring issues in research on children and media. Educational Researcher, 25, 5-9.